

IN THE CLAIMS

Please amend the claims to read as follows:

Listing of Claims

22. (Currently Amended) An OFDM-CDMA transmission apparatus comprising:

a first spreader that carries out spreading processing on a plurality of transmission signals at a predetermined spreading factor using different spreading codes respectively;

a second spreader that carries out spreading processing on a known signal at ~~a predetermined~~ the same spreading factor as the first spreader using a spreading code that is different from said spreading codes;

a frequency division multiplexer that breaks down the known signal after the spreading processing by the second spreader into individual chips and subjects the known signal chips to frequency division multiplexing by assigning said known signal chips to subcarriers aligned in a frequency axis direction, the number of said subcarriers matching said spreading factor, and subjects the transmission signals after the spreading processing by the first spreader to frequency division multiplexing by assigning said transmission signals to said subcarriers; and

a transmitter that transmits the known signal chips simultaneously and transmits said known signal chips and the transmission signals, assigned to the subcarriers by the frequency division multiplexer, simultaneously.

23. (Currently Amended) The OFDM-CDMA transmission apparatus according to claim 22, wherein the known signal that is spreading processed by said second spreader has a higher signal level than the transmission signals.

24. (Currently Amended) An OFDM-CDMA reception apparatus comprising:

a receiver that receives a signal in which:

a plurality of transmission signals and a known signal are subjected to spreading processing at ~~a predetermined~~ the same spreading factor using different spreading codes respectively;

the known signal after the spreading processing is broken down into individual chips and the known signal chips are subjected to frequency division multiplexing and are assigned to subcarriers aligned in a frequency axis direction, the number of said subcarriers matching said spreading factor; and

the transmission signals after the spreading processing are subjected to frequency division multiplexing and assigned to said subcarriers; and

~~the transmission signals and the known signal are transmitted simultaneously;~~

a first demodulator that carries out despreading processing on the signal received by the receiver using a predetermined spreading codes code and extracts received versions of the transmission signals;

a second demodulator that carries out despreading processing on the signal received by the receiver using the spreading code assigned to the known signal and extracts a received version of the known signal which is broken down into individual chips, the known signal chips being transmitted simultaneously and being transmitted simultaneously with the transmission signals;

a phase error detector that detects a residual phase error using the known signal and the received version of said known signal; and

a phase compensator that carries out phase compensation on the received versions of the transmission signals using the detected residual phase error.

25. (Currently Amended) A communication terminal apparatus equipped with an OFDM-CDMA transmission apparatus and an OFDM-CDMA reception apparatus, wherein:

said OFDM-CDMA transmission apparatus comprises:

a first spreader that carries out spreading processing on a plurality of transmission signals at a predetermined spreading factor using different spreading codes respectively;

a second spreader that carries out spreading processing on a known signal at ~~a predetermined~~ the same spreading factor as the first spreader using a spreading code that is different from said spreading codes;

a frequency division multiplexer that breaks down the known signal after the spreading processing by the second spreader into individual chips and subjects the known signal chips to frequency division multiplexing by assigning said known signal chips to subcarriers aligned in a frequency axis direction, the number of said subcarriers matching said spreading factor, and subjects the transmission signals after the spreading processing by the first spreader to frequency division multiplexing by assigning said transmission signals to said subcarriers; and

a transmitter that transmits the known signal chips simultaneously and transmits said known signal chips and the transmission signals, assigned to the subcarriers by the frequency division multiplexer, simultaneously; and said OFDM-CDMA reception apparatus comprises:

a receiver that receives a signal in which:

a plurality of transmission signals and a known signal are subjected to spreading processing at a predetermined the same spreading factor using different spreading codes respectively;

the known signal after the spreading processing is broken down into individual chips and the known signal chips are subjected to frequency division multiplexing and are assigned to subcarriers aligned in a frequency axis direction, the number of said subcarriers matching said spreading factor; and

the transmission signals after the spreading processing are subjected to frequency division multiplexing and assigned to said subcarriers; and

~~the transmission signals and the known signal are transmitted simultaneously;~~

a first demodulator that carries out despreading processing on the signal received by the receiver using a

predetermined spreading codes code and extracts received versions of the transmission signals;

a second demodulator that carries out despreading processing on the signal received by the receiver using the spreading code assigned to the known signal and extracts a received version of the known signal which is broken down into individual chips, the known signal chips being transmitted simultaneously and being transmitted simultaneously with the transmission signals;

a phase error detector that detects a residual phase error using the known signal and the received version of said known signal; and

a phase compensator that carries out phase compensation on the received versions of the transmission signals using the detected residual phase error.

26. (Currently Amended) A base station apparatus equipped with an OFDM-CDMA transmission apparatus and an OFDM-CDMA reception apparatus, wherein:

said OFDM-CDMA transmission apparatus comprises:

a first spreader that carries out spreading processing on a plurality of transmission signals at a predetermined

spreading factor using different spreading codes

respectively;

a second spreader that carries out spreading processing on a known signal at ~~a predetermined~~ the same spreading factor as the first spreader using a spreading code that is different from said spreading codes;

a frequency division multiplexer that breaks down the known signal after the spreading processing by the second spreader into individual chips and subjects the known signal chips to frequency division multiplexing by assigning said known signal chips to subcarriers aligned in a frequency axis direction, the number of said subcarriers matching said spreading factor, and subjects the transmission signals after the spreading processing by the first spreader to frequency division multiplexing by assigning said transmission signals to said subcarriers; and

a transmitter that transmits the known signal chips simultaneously and transmits said known signal chips and the transmission signals, assigned to the subcarriers by the frequency division multiplexer, simultaneously; and said OFDM-CDMA reception apparatus comprises:

a receiver that receives a signal in which:

a plurality of transmission signals and a known signal are subjected to spreading processing at a predetermined the same spreading factor using different spreading codes respectively;

the known signal after the spreading processing is broken down into individual chips and the known signal chips are subjected to frequency division multiplexing and are assigned to subcarriers aligned in a frequency axis direction, the number of said subcarriers matching said spreading factor; and

the transmission signals after the spreading processing are subjected to frequency division multiplexing and assigned to said subcarriers; and

~~the transmission signals and the known signal are transmitted simultaneously;~~

a first demodulator that carries out despreading processing on the signal received by the receiver using a predetermined spreading codes code and extracts received versions of the transmission signals;

a second demodulator that carries out despreading processing on the signal received by the receiver using the spreading code assigned to the known signal and extracts a received version of the known signal which is broken down

into individual chips, the known signal chips being
transmitted simultaneously and being transmitted
simultaneously with the transmission signals;

a phase error detector that detects a residual phase error using the known signal and the received version of said known signal; and

a phase compensator that carries out phase compensation on the received versions of the transmission signals using the detected residual phase error.

27. (Currently Amended) A transmission method comprising:
a first spreading step of carrying out spreading processing
on a plurality of transmission signals at a predetermined
spreading factor using different spreading codes respectively;
a second spreading step of carrying out spreading processing
on a known signal at a predetermined the same spreading factor as
in the first spreading step using a spreading code that is different from said spreading codes;

a frequency division multiplexing step of breaking down the
known signal, after the spreading processing in the second
spreading processing, step into individual chips,

and subjecting the known signal chips to frequency division multiplexing by assigning said known signal chips to subcarriers

aligned in a frequency axis direction, the number of said subcarriers matching said spreading factor;

, and subjecting the transmission signals, after the spreading processing in the first spreading processing, step to frequency division multiplexing by assigning said transmission signals to said subcarriers; and

a transmission step of transmitting the known signal chips simultaneously and transmitting said known signal chips and the transmission signals, assigned to the subcarriers by in the frequency division multiplexing, step simultaneously.

28. (Currently Amended) A reception method comprising:
a reception step of receiving a signal in which:

a plurality of transmission signals and a known signal are subjected to spreading processing at ~~a predetermined~~ the same spreading factor using different spreading codes respectively;

the known signal after the spreading processing is broken down into individual chips and the known signal chips are subjected to frequency division multiplexing and are assigned to subcarriers aligned in a frequency axis direction, the number of said subcarriers matching said spreading factor; and

the transmission signals after the spreading processing are subjected to frequency division multiplexing and assigned to said subcarriers; and

~~the transmission signals and the known signal are transmitted simultaneously;~~

a demodulation step of carrying out despread processing on the signal received by in the receiver using predetermined spreading codes and extracting received versions of the transmission signals;

~~despreading the signal received by the receiver~~ reception step using the spreading code assigned to the known signal and extracting a received version of the known signal which is broken down into individual chips, the known signal chips being transmitted simultaneously and being transmitted simultaneously with the transmission signals;

a phase error detection step of detecting a residual phase error using the known signal and the received version of said known signal; and

a phase error compensation step of carrying out phase compensating compensation on the received versions of the transmission signals using the detected residual phase error.